

REMARKS

Claims 1-19 all the claims pending in the application, stand rejected on prior art grounds and upon informalities. In addition, the specification is objected to due to an informality. Applicants respectfully traverse these objections/rejections based on the following discussion.

I. The 35 U.S.C. §112, First Paragraph, Rejection

Claims 1-19 stand rejected under 35 U.S.C. §112, first paragraph. In response to the rejections independent claims 1, 10 and 20 are amended herein removing the feature "wherein said remaining amount of oxygen comprises less than 5×10^{12} atoms/cm² and is sufficient." In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw the rejections.

II. The Prior Art Rejections

Claims 1-4, 6-14, and 16-19 stand rejected under 35 U.S.C. §103(a) as being unpatentable over admitted prior art in view of Comita, et al. (U.S. Patent No. 6,774,040), hereinafter referred to as Comita. Claims 5 and 15 stand rejected under 35 U.S.C. §103(a) as being unpatentable over admitted prior art in view of Comita and further in view of Paton, et al. (U.S. Patent No. 6,811,448), hereinafter referred to as Paton. Applicants respectfully traverse these rejections based on the following discussion.

Regarding amended independent claims 1, 10, and 19, the Applicants submit that the admitted prior art and Comita in combination do not teach or suggest the feature of "heating said silicon germanium (or silicon) surface in a chlorine containing environment *without a silicon gas* so as to remove said remaining amount of oxygen from said silicon germanium surface and minimize surface roughening of said silicon germanium (or silicon) surface *without depositing*

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any silicon onto said silicon germanium surface.” Additionally, regarding amended dependent claims 9 and 18, the Applicants submit that the admitted prior art and Comita in combination do not teach or suggest the feature that the “chlorine containing environment comprises a mixture of a larger flow of hydrogen with smaller flow of mixture of HCl with GeH₄.”

More particularly, referring to paragraph [0033], the present invention “provides a process that combines both an HF etch and a chlorine containing environment hydrogen pre-bake. The HF etch removes most of oxygen at the surface. Then, this is followed with chlorine containing environment hydrogen pre-bake, to remove the remaining oxygen. This is used successfully to keep the surface from roughening, while still removing all oxygen” from the silicon or silicon germanium surface. Paragraph [0033] discloses a mixture of HCL and DCS for the chlorine containing environment. However, paragraph [0033] further discloses that it is possible to use “a mixture of HCL with any one or any combination of SiH₄, DCS, SiHCL₃, Si₂H₆ and GeH₄” and “[i]t is also possible to use HCL only.” Thus, specification discloses that the chlorine containing environment can be “*without a silicon gas* so as to remove said remaining amount of oxygen from said silicon germanium (or silicon) surface and minimize surface roughening of said silicon germanium surface *without depositing any silicon* onto said silicon germanium surface.” Additionally, the specification discloses that chlorine containing environment comprises a mixture of a larger flow of hydrogen with smaller flow of mixture of HCl with GeH₄.

Comita discloses a method and an apparatus for uniformly smoothing a silicon or silicon alloy surface and uniformly adding silicon to the surface (see col. 1, lines 60-63). The method disclosed in Comita is distinguishable from that of the claimed invention in that Comita discloses a method of smoothing a rough surface (see Figure 3A of Comita), whereas the claimed invention discloses a method that avoids roughening of an already smooth surface (see paragraph [0020] of the specification). Specifically, Comita discloses two gas mixtures that simultaneously flow from different channels into a process chamber and onto a spinning wafer. The gas mixtures each comprise different concentrations of a silicon etchant (e.g., HCL) and a silicon source gas (see col. 1, lines 39-53). The gas mixtures are directed towards different locations on

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the spinning wafer so that as the etchant of each mixture etches the silicon surface and as the silicon source gas of each mixture adds silicon to the surface a uniformly smooth surface is provided (see col. 1, lines 53-63). Thus, the Comita invention smooths a rough surface by a combination of both etching the silicon surface (which necessarily results in the removal of contaminants) and depositing additional silicon. Comita further discloses that the ratio of gases can be adjusted to vary the overall removal/addition rates of the silicon film (see column 11, line 65-column 12, line 19).

Comita does not, however, disclose a mixture of gases without a silicon source gas, nor does it disclose a mixture of gases with GeH_4 . Consequently, since Comita does not disclose a mixture of gases without a silicon source gas, Comita necessarily does not disclose the feature of minimizing "surface roughening of said silicon germanium surface *without depositing any silicon*". Specifically, because the mixtures of Comita all contain a silicon source gas, regardless of whether there is an overall etch or deposit rate, silicon is still being deposited and then, possibly removed.

Therefore, independent claims 1, 10 and 19 are patentable over the admitted prior art in view of Comita. Claims 7, 8, and 17 are herein canceled. Furthermore, dependent claims 2-6, 11-16 and 18 are similarly patentable, not only by virtue of their dependency from a patentable independent claim, but also by virtue of the additional features of the invention they define. Moreover, the Applicants note that all claims are properly supported in the specification and accompanying drawings, and no new matter is being added. In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw the rejections.

III. Formal Matters and Conclusion

With respect to the objection to the specification, the specification has been amended to overcome this objection. In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw the objection.

Also, in view of the foregoing, Applicants submit that claims 1-6, 9-16 and 18 all the

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claims presently pending in the application, are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary.

Please charge any deficiencies and credit any overpayments to Attorney's Deposit Account Number 09-0458.

Respectfully submitted,

Dated:

1/20/06



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